

What is claimed is:

1. A fixed-bed shell-and-tube reactor, wherein a solid particulate material is weighed so as to be uniform volume, and is packed in each reaction tube
5 in a packing time of not shorter than 30 seconds per liter.

2. A fixed-bed shell-and-tube reactor according to claim 1, wherein the packing of the solid particulate material is carried out so that the pressure drop of the plurality of reaction tubes will be each in the range of 85 to 115 % of the average
10 pressure drop, wherein the pressure drop is caused by packing the solid particulate material.

3. A fixed-bed shell-and-tube reactor according to claim 1, wherein the packing of the solid particulate material is carried out so that the length of a layer
15 of the packed solid particulate material in the plurality of reaction tubes will be each in the range of 90 to 110 % of the average length of the packed layer.

4. A fixed-bed shell-and-tube reactor according to claim 1, wherein the tube diameter of the reaction tube is in the range of 15 to 50 mm.

5. A fixed-bed shell-and-tube reactor according to claim 4, wherein the ratio of the diameter of the solid particulate material and the tube diameter is in the range of 0.1/1 to 0.5/1.

5 6. A fixed-bed shell-and-tube reactor according to claim 1, wherein the solid particulate material is at least one kind selected from the following groups (1) to (9):

(1) a catalyst that comprises silver as an essential component, and is for a production of ethylene oxide by oxidizing ethylene in a gas phase;

10 (2) a catalyst that comprises molybdenum, bismuth, and iron as essential components, and is for a production of (meth)acrolein and (meth)acrylic acid by oxidizing propylene, isobutylene, tert-butanol, and/or methyl tert-butyl ether in a gas phase;

15 (3) a catalyst that comprises molybdenum and vanadium as essential components, and is for a production of acrylic acid by oxidizing acrolein in a gas phase;

(4) a catalyst that comprises molybdenum and phosphorus as essential components, and is for a production of methacrylic acid by oxidizing methacrolein in a gas phase;

20 (5) a catalyst that comprises vanadium and titanium as essential

components, and is for a production of phthalic anhydride by oxidizing o-xylene and/or naphthalene in a gas phase;

(6) a catalyst that comprises molybdenum as an essential component, and is for a production of maleic anhydride by oxidizing benzene in a gas phase;

5 (7) a catalyst that comprises phosphorus and vanadium as essential components, and is for a production of maleic anhydride by oxidizing n-butane in a gas phase;

(8) a catalyst that comprises molybdenum as an essential component, and is for a production of propylene, acrolein, and/or acrylic acid by oxidizing propane
10 in a gas phase; and

(9) a catalyst that comprises vanadium as an essential component, and is for a production of pyromellitic anhydride by oxidizing durene in a gas phase.

7. A production process for each substance, which comprises the
15 step of using the fixed-bed shell-and-tube reactor as recited in claim 6.